BURDEN OF ORAL DISEASE IN MICHIGAN, 2005

Michigan Department of Community Health

MDCH

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INTRODUCTION

The mouth is vital to our everyday life. It serves to nourish our bodies as we take in water and nutrients, to communicate our thoughts, our mood, and our dreams, and to distinguish our appearance from others. Oral health is an essential and integral component of people's overall health throughout life, and includes more than just healthy teeth. Oral refers to the whole mouth: the teeth, gums, hard and soft palate, linings of the mouth and throat, tongue, lips, salivary glands, chewing muscles, and upper and lower jaws. Not only does good oral health mean being free of tooth decay and gum disease, but it also means being free of chronic oral pain conditions, oral cancer, and other conditions that affect the mouth and throat. Good oral health also includes the surgical correction and treatment of birth defects such as cleft lip and palate. Good oral health includes the ability to carry on the most basic human functions such as chewing, swallowing, speaking, smiling, kissing, and singing.

Because the mouth is an integral part of human anatomy, oral health is intimately related to the health of the rest of the body. For example, mounting evidence suggests that infections in the mouth such as periodontal (gum) diseases can increase the risk for heart disease, can put pregnant women at greater risk for premature delivery, and can complicate control of blood sugar for people living with diabetes. Conversely, changes in the mouth often are the first signs of problems elsewhere in the body such as infectious diseases, immune disorders, nutritional deficiencies, and cancer.

This report summarizes the current status of oral health in Michigan and establishes a documented burden of disease, disparities in disease and access, and comparisons between Michigan and national data. Where state data deficiencies exist national information is used instead, with each data source having its own limitations. This summary of the oral health disease burden should provide a valuable resource for the public, clinicians, researchers, public health professionals, and policy makers to increase awareness, to guide prevention and treatment efforts, and to enhance the quality of life for Michigan residents.

NATIONAL AND STATE OBJECTIVES ON ORAL HEALTH

Oral Health in America: A Report of the Surgeon General (the *Report*) alerted Americans to the importance of oral health in their daily lives [USDHHS 2000a]. Issued in May 2000, the *Report* further detailed how oral health is promoted, how oral diseases and conditions are prevented and managed, and what needs and opportunities exist to enhance oral health. The *Report*'s message was that oral health is essential to general health and well-being and can be achieved. However, a number of barriers hinder the ability of some Americans from attaining optimal oral health. The Surgeon General's *Report* concluded with a framework for action, calling for a national oral health plan to improve quality of life and eliminate oral health disparities.

One component of a national oral health plan is a set of measurable and achievable objectives on key indicators of oral disease burden, oral health promotion, and oral disease prevention. A similar set of indicators was developed in November 2000 as part of *Healthy People 2010,* a document that presents a comprehensive, nationwide health promotion and disease prevention agenda [USDHHS 2000b]. It is designed to serve as a roadmap for improving the health of all people in the United States during the first decade of the 21st century. Included in *Healthy People 2010* are objectives for improving oral health. These objectives represent the ideas and expertise of a diverse range of individuals and organizations concerned about the Nation's oral health.

The Surgeon General's Report on Oral Health has spurred policy makers, community leaders, private industry, health professionals, the media, and the public to affirm that oral health is essential to general health and well-being and to take action. That call to action led a broad coalition of public and private organizations and individuals to generate *A National Call to Action to Promote Oral Health* [USDHHS 2003]. The Vision of the *Call to Action* is "To advance the general health and well-being of all Americans by creating critical partnerships at all levels of society to engage in programs to promote oral health and prevent disease." The goals of the *Call to Action* reflect those of *Healthy People 2010*:

- To promote oral health
- To improve quality of life
- To eliminate oral health disparities

National objectives on oral health such as those in *Healthy People 2010* provide measurable targets for the nation, but most core public health functions of assessment, assurance, and policy development occur at the State level. TABLE I summarizes the *Healthy People 2010* Oral Health Objectives for the Nation and the current status of each indicator for the United States and Michigan.

Table I. Healthy People 2010 Oral Health indicators, target levels, and current status in the United States and Michigan			
Healthy People 2010 Objective	Target	US Status	Michigan Status
21-1: Dental caries experience			
Young Children, ages 2-4	11%	18%	DNA
Children, ages 6-8	42%	52%	DNA
Adolescents, age 15	51%	61%	DNA
21-2: Untreated caries			
Young Children, ages 2-4	9%	16%	DNA
Children, ages 6-8	21%	29%	DNA
Adolescents, age 15	15%	20%	DNA
Adults, age 35-44	15%	27%	DNA
21-3: Adults with no tooth loss, ages 35-44	42%	31%	60%
21-4: Edentulous (toothless) older adults, ages 65-74	20%	26%	18%
21-5: Periodontal diseases, adults ages 35-44			
Gingivitis	41%	48%	DNA
Destructive periodontal diseases	14%	22%	DNA
3-6: Oral Cancer Mortality Rate (per 100,000 persons)	2.7	3.0	2.9
21-6: Oral Cancer Detected at Earliest Stage	50%	35%	40%
21-7: Oral Cancer exam in past 12 months, age 40+	20%	13%	DNA
21-8: Dental Sealants			
Children, age 8 (1st molars)	50%	23%	33%
Adolescents, age 14 (1st & 2nd molars)	50%	15%	DNA
21-9: Population served by fluoridated water systems	75%	62%	87%
21-10: Dental visit within past 12 months			
Children, age 2+	56%	44%	51%
Adults, age 18+	56%	44%	76%
21-11: Dental visits in past 12 months, adults in long-term care	25%	19%	DNA
21-12: Preventive dental care in past 12 months, low-income children and adolescents, age 0-18	57%	20%	23%
21-13: School-based health centers with oral health component, K-12	DNA	DNA	DNA
21-14: Community based health centers and local health departments with oral health component	75%	34%	29%
21-15: States with system for recording and referring infants with cleft lip and palate	100%	23%	100%
21-16: States with an oral health surveillance system	100%	DNA	100%
21-17: State and local dental programs with a public health trained director	100%	DNA	DNA

DNA = Data Not Available

EXECUTIVE SUMMARY

This summary is intended to highlight the oral disease burden in Michigan. The disease burden does not simply include the individuals with disease, but also includes the state's capacity to prevent oral disease and provide care for those affected by oral disease. Additional information is included in the full text of the oral disease burden document.

CONCLUSIONS

Epidemiology of Oral Disease

1. Early Childhood Caries (ECC) results when caries (cavities) develop on the primary teeth of young children. ECC frequently results from inappropriate bottle use or a lack of parental awareness of their child's dental needs. In 2003, Hispanics were more likely to report inappropriate bottle use (76% vs. 27% in non-Hispanics), as were young parents (41% vs. 18% in parents age 30-39 years).

2. Frequent consumption of juices, soda pops, and sports drinks puts many Michigan residents at risk for caries, particularly adolescents.

3. Adult caries, including root caries, are seen more frequently in American Indian, Black non-Hispanics, and Hispanic populations. Adult caries are more prevalent among men and persons with less education (Table III).

4. Michigan residents are more likely to retain their teeth than their national counterparts. However, Black non-Hispanics are more likely to be missing at least one tooth at age 35-44 and to be edentulous (without teeth) at age 65-74. Residents in the city of Detroit are also more likely to be missing teeth than residents across the rest of Michigan (Table IV & V).

5. Periodontitis is the leading cause of bleeding, pain, infection, and tooth loss among adults. Gingivitis and periodontitis are most prevalent in American Indians, Mexican Americans, and persons with less than a high school education (Table VI). Periodontal disease in pregnant women may increase the risk of preterm labor.

6. Diabetics are at increased risk for periodontal disease, at increased risk for tooth loss, and less likely to visit a dentist. However, in Michigan the number of diabetics having lost 6 or more teeth has declined (52% in 1996 to 42% in 2002) and the number of diabetics visiting the dentist has increased (57% in 1996 to 70% in 2002).

7. The incidence of oral cancer in Michigan was 11.5 new cases per 100,000 persons from 1991-2000, 11% higher than the national rate. The incidence rate was 2.6 times higher for males and 1.28 times higher for African Americans. The incidence in Wayne County was 1.24 times the state incidence rate.

8. Early detection of oral cancer is critical to survival. In Michigan, only 40% of oral cancers were detected at an early stage. The 5-year survival rate for oral cancer was 1.7 times higher in Whites than African Americans (52% vs. 30%). Individuals that smoke and drink alcohol excessively are most at risk, but less likely to be seen by a dentist.

Prevention of Oral Disease

1. Community water fluoridation is one of the 10 greatest public health achievements in the past century and has been the basis for primary prevention of caries for the past 60 years. While 87% of Michigan residents served by community water supplies receive adequately fluoridated water, citizens in the Northern Lower Peninsula and the Western Upper Peninsula are much less likely to have access to fluoridated water (Figure 4).

2. Dental sealants are effective in preventing decay in areas of the tooth where fluoridation is less effective. In Michigan, 33% of children ages 8-9 had dental sealants present on their first molars in 2003. African Americans and Hispanics were less likely to have sealants placed than Whites. However, all racial and ethnic groups fail to meet the 50% objective set forth by Healthy People 2010.

3. Adults in Michigan were more likely to visit a dentist and have their teeth cleaned than adults nationwide. Unfortunately, Black non-Hispanics and persons with less than a high school education in Michigan were less likely to have visited a dentist or had their teeth cleaned than White non-Hispanics or persons with a high school education (Table IX & XI).

4. Just 23% of Medicaid children visited the dentist and only 21% had their teeth cleaned in 2002. By contrast, 51% of all children visited the dentist and 48% had their teeth cleaned in 2002. Children under the age of 5, regardless of insurance coverage, were least likely to have visited the dentist or to have their teeth cleaned.

Oral Health Workforce

1. An adequately trained oral health workforce is critical to the delivery of quality dental care in Michigan. As of 2004, 65 counties in Michigan were designated as full or partial health provider shortage areas for dental services.

2. Dentists are maldistributed across Michigan resulting in a deficiency of providers in primarily rural areas. Eleven Michigan counties have less than five dentists, including one county that has no dentist available.

3. Of the 6,444 licensed dentists practicing in Michigan, just 552 (8.6%) are considered critical access providers, or having Medicaid claims totaling $10,000 or more over a one-year period. This is equivalent to providing care for three to four Medicaid children per week.

4. The lack of workforce diversity in oral health is a problem nationwide, since culturally competent care is important to the continuity of dental care. Just 1.9% of dentists nationally identified themselves as African American, and only 2.7% of dentists nationally identified themselves as Hispanic.

Access to Oral Health Services

1. In FY2003, 3% of Medicaid dollars nationally were spent for dental services. By comparison, in FY2002, prior to elimination of the adult Medicaid dental benefit, Michigan spent just 1% of its Medicaid dollars on dental services.

2. Persons with developmental and physical disabilities face additional challenges when seeking dental care since many dentists feel uncomfortable providing care to these populations. Population-based surveys in 2001 and 2003 estimated 7-9% of children with special health care needs had unmet needs for dental care in Michigan.

3. Michigan's Healthy Kids Dental program has improved access to dental care for Medicaid children. Increased utilization was evident within the program's first year and improved each year (Figure 7). The program has also increased provider participation in addressing dental needs of low-income children.

4. There are several safety-net dental service providers (federally-qualified health centers, local health departments, mobile dental clinics, adolescent health centers, the Indian Health Service, etc.) in Michigan. However, just 13 of 45 local health departments (29%) provide dental services, well below the HP2010 goal of 75%.

5. Most children in Michigan have some form of dental insurance, whether through employer-based coverage (57.3%), government-based coverage (24.4%), or self-purchased coverage (2.7%). Despite these insurance systems, 15.6% of children still had no dental coverage in Michigan in 2003.

THE BURDEN OF ORAL DISEASES

In April 2004, the Michigan Surgeon General released Healthy Michigan 2010 which proposed several health objectives for Michigan. This report acknowledged inadequate access to dental services among low-income individuals. However, this report failed to address in its objectives either the burden or prevention of oral disease. Therefore, stronger partnerships must develop within the state and among stakeholders to promote oral health awareness and the integration of oral health into overall health.

Caries Experience (Cavities) and Untreated Decay

Nationally, dental caries (tooth decay) is five times more common than childhood asthma and seven times more common than hay fever. Dental caries is a disease in which acids produced by bacteria on the teeth lead to loss of minerals from the enamel and dentin, the hard substances of teeth. Unchecked, dental caries can result in loss of tooth structure, inadequate tooth function, unsightly appearance, pain, infection, and tooth loss.

The prevalence of decay in children is measured through the assessment of caries experience (if they have ever had decay and now have fillings), untreated decay (active unfilled cavities), and urgent care (reported pain or a significant dental infection that requires immediate care).

Early Childhood

Early Childhood Caries (ECC) occurs in young children (typically infants and toddlers) when caries develop on the primary teeth. Typical culprits in the development of ECC include a lack of parental education about the oral health needs of the child and inappropriate use of baby bottles and/or sipper cups. Inappropriate use is characterized by bottle feeding with juice or soda, or providing a bottle for overnight use that contains any sugary beverage, including milk. Repeated inappropriate bottle use can eventually lead to an early onset of rampant caries. Severe ECC requires extensive dental work, including hospital inpatient stays, multiple tooth extractions, and anesthesia.

The prevalence of ECC in Michigan is unknown, but a recent survey of Michigan parents estimates that, 29.3% of Michigan parents sent their child to bed with a bottle of juice, soda, or milk within the previous 30 days. Rates were higher for parents under the age of 30 years (41.4% vs. 18.4% for ages 30-39 years). Hispanics were more likely to report inappropriate bottle use than non-Hispanics (76.5% vs. 27.3%). [Eklund 2003]

While the immediate effects of ECC can be devastating, long-term effects can be equally damaging. If these primary teeth, which help guide permanent teeth into place, have been lost due to decay, then it can impact how the permanent teeth establish themselves within the mouth.

Children

With the development of Michigan's oral health surveillance system, caries experience and untreated decay will be monitored by Michigan and contributed to the National Oral Health Surveillance System (NOHSS). The first statewide assessment of these indicators will begin in September of 2005 and data will be made available as soon as analysis has been completed. Table II describes the prevalence of caries and untreated decay in the nation as a whole.

Table II: Dental caries experience and untreated decay among 6-8 year old children in the US by selected demographic characteristics, NHANES 1999-2000

	Caries Experience	Untreated Decay
	United States (%)	United States (%)
Healthy People 2010 Target	42%	21%
Total	50%	26%
By Race/Ethnicity		
American Indian/Alaska Native	91%[a]	69%[a]
Native Hawaiian/Pacific Islander	79%[c]	39%[c]
Asian	90%[b]	71%[b]
Mexican American	69%	42%
White non-Hispanic	46%	21%
Black non-Hispanic	56%	39%
By Sex		
Female	49%	24%
Male	50%	28%
By Parent Education Level		
Less than High School	65%[d]	44%[d]
High School Graduate	52%[d]	30%[d]
At least some college	43%[d]	25%[d]
By Specified Population		
3rd Grade Students	60%[d]	33%[d]

[a] Data are for Indian Health Service areas, 1999
[b] Data are for California, 1993–94
[c] Data are for Hawaii, 1999
[d] Data are from NHANES III, 1988–1994

Adolescents

Recent observations suggest severe dental conditions similar to ECC occur in teenagers. However, with the severe deterioration of the permanent teeth, this condition has more extreme lifetime consequences. Frequently, such an extensive caries condition results from a cumulative over-consumption of sugar-laden beverages such as fruit juices, sodas, and sports drinks. The resulting decay can present immediately, but the full impact may not be evident until early adulthood. Thus, availability and exposure to these beverages during adolescence serve as barriers to preventing caries in adolescence and adulthood.

Adults

People are susceptible to dental caries throughout their lifetime. Like children and adolescents, adults also experience decay on the crown (enamel covered) portion of the tooth. But adults also may develop caries on the root surfaces of teeth as those surfaces become exposed to bacteria and carbohydrates as a result of gum recession. In the most recent national examination survey, 85% of U.S. adults had at least one tooth with decay or a filling on the crown. Root surface caries had affected 50% of adults aged 75 years or older [USDHHS 2000a].

Table III: Proportion of US adults* with untreated dental caries, by selected age groups and demographic characteristics, NHANES 1999-2000

	Age 35-44 years	Age 65-74 years
	United States (%)	United States (%)
Healthy People 2010 Target	15%	15%
Total	26%	19%
By Race		
American Indian/Alaska Native	67%[a]	DNA
Black non-Hispanic	44%	47%
Hispanic/Latino	41%[b]	27%[b]
White non-Hispanic	19%	18%[d]
By Sex		
Female	25%	14%[d]
Male	27%	24%
By Education Level		
Less than high school	51%[c]	DNA
High school graduate	34%[c]	DNA
At least some college	16%[c]	DNA

DNA = Data Not Available
*Excludes edentulous adults
[a] Indian Health Service, 1999
[b] National data are for Mexican-Americans
[c] Data from NHANES III, 1988-94
[d] Statistically unreliable

Tooth Loss

A full dentition is defined as having 28 natural teeth, exclusive of third molars (wisdom teeth) and teeth removed for orthodontic treatment or as a result of trauma. Most persons can keep their teeth for life with adequate personal, professional, and population-based preventive practices. As teeth are lost, a person's ability to chew and speak decreases and interference with social functioning can occur. The most common reasons for tooth loss in adults are tooth decay and periodontal (gum) disease. Tooth loss can also result from infection, unintentional injury, and head and neck cancer treatment. In addition, certain orthodontic and prosthetic services sometimes require the removal of teeth.

Despite an overall trend toward a reduction in tooth loss in the U.S. population, not all groups have benefited to the same extent. Females tend to have more tooth loss than males of the same age group. African Americans are more likely than whites to have tooth loss. The percentage of whites who have never lost a permanent tooth is more than three times as great as for African Americans. Among all predisposing and enabling factors, low educational level often has been found to have the strongest and most consistent association with tooth loss.

Table IV compares the percentage of adults who never had a tooth extracted due to disease in Michigan to the United States and the percentage of adults who are edentulous (without any teeth). In Michigan, 40% of adults age 35-44 have lost at least one tooth due to caries, infection, or periodontal disease. 20% of Michigan adults age 65-74 have lost all their teeth, or are edentulous. The individuals at most risk are those of lower educational levels and those of racial minorities, particularly African-Americans.

Table IV: Proportion of adults age 35-44 who have lost no teeth and proportion of adults age 65-74 that have lost all natural teeth, by selected demographic characteristics-Michigan vs. US, BRFSS 2002

	Age 35-44 No Teeth Extracted		Age 65-74 Lost All Natural Teeth	
	Michigan (%)	United States[1] (%)	Michigan (%)	United States (%)
Healthy People 2010 Target	42%	42%	20%	20%
Total	60%	39%	18%	25%
By Race/Ethnicity				
American Indian /Alaska Native	DNA	23%[a]	DNA	25%[a]
Black non-Hispanic	36%	30%	DNA	34%
Hispanic/Latino	DNA	38%[b]	DNA	20%
White non-Hispanic	65%	43%	13%	23%

Table IV: Proportion of adults age 35-44 who have lost no teeth and proportion of adults age 65-74 that have lost all natural teeth, by selected demographic characteristics-Michigan vs. US, BRFSS 2002, continued				
	Age 35-44 No Teeth Extracted		Age 65-74 Lost All Natural Teeth	
	Michigan (%)	United States[1] (%)	Michigan (%)	United States (%)
By Sex				
Female	61%	36%	19%	24%
Male	60%	42%	16%	24%
By Education Level				
Less than high school	29%	15%[c]	35%	43%
High school graduate	48%	21%[c]	18%	23%
At least some college	71%	41%[c]	11%	13%

DNA = Data Not Available
[1] NHANES 1999-2000
[a] Indian Health Service, 1999
[b] Data are for Mexian Americans only
[c] NHANES III, 1988-1994

While Michigan compares favorably to the nation as a whole, the city of Detroit bears a greater proportion of adult tooth loss. Table V compares tooth loss between the city of Detroit and the state of Michigan for the years 1996-2002. Detroit adults at all ages were more likely to have lost teeth, and at older ages were more likely to be edentulous. [CDC 1996; CDC 1999b; CDC 2002c]

Table V: Proportion of adults, 18-74, who have lost no teeth and proportion of adults that have lost all natural teeth, by selected demographic characteristics, Michigan vs. Detroit, BRFSS 1996-2002				
	No teeth extracted		Lost all natural teeth	
	Michigan (%)	Detroit (%)	Michigan (%)	Detroit (%)
Healthy People 2010 Target	42%	42%	20%	20%
Total	54%	40%	6%	12%
By Race/Ethnicity				
White	56%	39%	6%	18%
Black	41%	39%	10%	11%
By Gender				
Female	53%	34%	7%	12%
Male	56%	47%	5%	11%
By Age Group				
35-44	59%	34%	DNA	DNA
45-54	46%	21%	DNA	DNA
55-64	30%	9%	11%	21%
65-74	20%	10%	20%	44%

Table V: Proportion of adults, 18-74, who have lost no teeth and proportion of adults that have lost all natural teeth, by selected demographic characteristics, Michigan vs. Detroit, BRFSS 1996-2002, continued				
	No teeth extracted		Lost all natural teeth	
	Michigan (%)	Detroit (%)	Michigan (%)	Detroit (%)
By Education Level				
High school graduate or less	41%	39%	11%	17%
Some college	58%	38%	5%	7%
College graduate	71%	44%	1%	5%

DNA = Data Not Available

Periodontal (Gum) Diseases

Gingivitis is characterized by localized inflammation, swelling, and bleeding gums without a loss of the bone that supports the teeth. Gingivitis usually is reversible with good oral hygiene. Removal of dental plaque from the teeth on a daily basis is extremely important to prevent gingivitis, which can progress to destructive periodontal disease.

Periodontitis (destructive periodontal disease) is characterized by the loss of the tissue and bone that support the teeth. It places a person at risk of eventual tooth loss unless appropriate treatment is provided. Among adults, periodontitis is a leading cause of bleeding, pain, infection, loose teeth, and tooth loss [Burt & Eklund 1999].

Table VI summarizes the prevalence of gingivitis and destructive periodontitis in the United States. Nationally, the prevalence of gingivitis is highest among American Indians and Alaska Natives, Mexican Americans, and adults with less than a high school education. Cases of gingivitis likely will remain a substantial problem and may increase as tooth loss from dental caries declines or as a result of the use of some systemic medications. Although not all cases of gingivitis progress to periodontal disease, all periodontal disease starts as gingivitis. The major method available to prevent destructive periodontitis, therefore, is to prevent the precursor condition of gingivitis and its progression to periodontitis.

There is mounting evidence that uncontrolled periodontal disease in pregnant women contributes to preterm labor. [Offenbacher et al. 2001] Periodontal disease has also been implicated as a risk factor for cardiovascular disease. [Chun et al. 2005] Recent studies also suggest that oral piercing, particularly lower lip studs, may promote gingivitis and gum recession. [Brooks et al. 2003]

Table VI: Proportion of US adults age 35-44 with gingivitis or adults, age 65-74, with destructive periodontal disease*, by selected demographic characteristics		
	Age 35-44 Years Gingivitis[1]	Age 65-74 Years Destructive Periodontal Disease[2]
	United States (%)	United States (%)
Healthy People 2010 Target	41%	14%
TOTAL	48%	20%
By Race/Ethnicity		
American Indian/Alaskan Native	98%[a]	59%[a]
African American non-Hispanic	51%	24%
Hispanic/Latino	64%[b]	16%[b]
White non-Hispanic	47%	17%
By Sex		
Female	45%	14%
Male	52%	26%
By Education Level		
Less than High School	60%	35%[1]
High School Graduate	52%	28%[1]
At Least Some College	42%	15%[1]

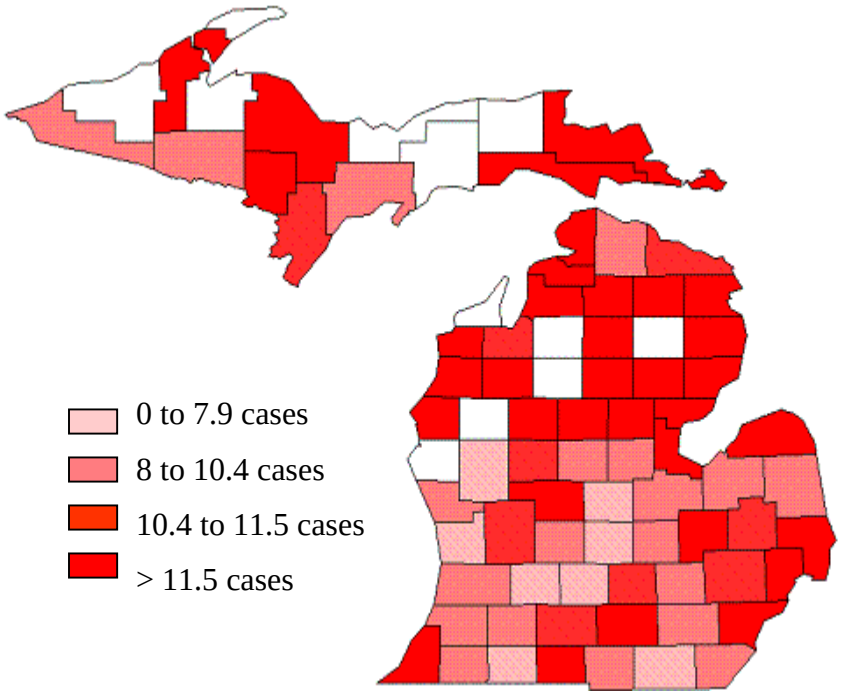
* Loss of attachment of ≥ 4mm
1 NHANES III, 1988-1994
2 NHANES 1999-2000
a Indian Health Service, 1999
b Data for Mexican Americans only

Oral Cancer

Cancer of the oral cavity or pharynx (oral cancer) is the fourth most common cancer in black / African American males and the seventh most common cancer in white males in the United States [Ries et al. 2004]. The incidence rate of oral cancer is comparable to that of cervical, stomach, and uterine cancer. An estimated 28,000 new cases of oral cancer and 7,200 deaths from these cancers occurred in the United States in 2004. The 2001 age-adjusted (to the 2000 U.S. population) incidence rate of oral cancer in the United States was 10.4 per 100,000 people. Nearly 90% of cases of oral cancer in the United States occur among persons aged 45 years and older. The age-adjusted incidence was more than twice as high among males (15.0) than among females (6.6), as was the mortality rate (4.1 vs. 1.6).

The Michigan Cancer Surveillance Program and the Metropolitan Detroit Surveillance System reported 10,581 new (incident) cases of invasive oral cancer in adults between 1991 and 2000 with 47% coming from Metropolitan Detroit. The statewide age-adjusted incidence rate for oral cancer was 11.5 new cases per 100,000 persons from 1991-2000. However, the incidence rate was 2.6 times higher in males than females (17.3 vs. 6.7) and 1.5 times higher in African American males than white males (25.0 vs. 16.2). Wayne County had an oral cancer incidence rate 1.24 times that of the rest of the state. Figure 1 depicts the incidence rate for cancers of the oral cavity and pharynx for Michigan, by county. [MOCPN 2003]

Figure 1: Age-adjusted oral cancer incidence rate per 100,000 persons, by county, in Michigan, 1991-2000. (Data is not available for all counties.)



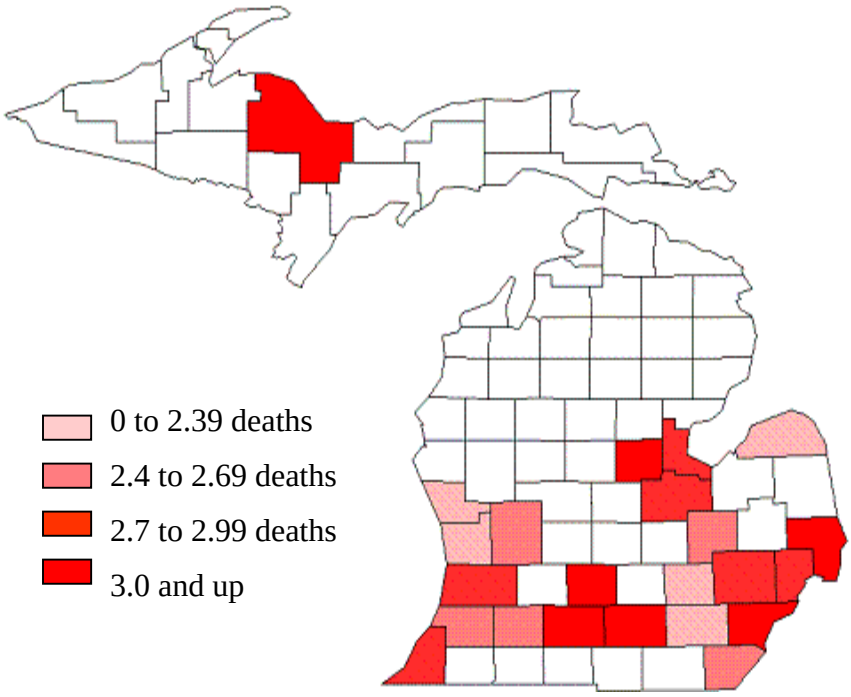
Epidemiology of Oral Cancer in Michigan, 2003

Survival rates for oral cancer have not improved substantially over the past 25 years despite significant progress in cancer treatments for other forms of cancer. More than 40% of persons diagnosed with oral cancer die within five years of diagnosis [Ries et al. 2004], although survival varies widely by stage of disease when diagnosed. Diagnosis at an early stage (localized) is crucial for improving survival. The 5-year relative survival rate for persons with oral cancer diagnosed at a localized stage is 81%. In contrast, the 5-year survival rate is only 51% once

the cancer has spread to regional lymph nodes at the time of diagnosis, and just 29% for persons with distant metastasis. In Michigan, white males have a 5-year survival rate that is 1.7 times that of African-American males. (52% vs. 30%) [MOCPN 2003]

There were 2,635 oral cancer deaths in Michigan between 1991-2000 with 47.5% of those deaths coming from metropolitan Detroit. The age-adjusted oral cancer mortality rate in Michigan during this time was 2.9 cases per 100,000 individuals. Age-specific mortality was higher for males than females at all ages. African Americans were 1.5 times more likely to die than non African Americans (4.3 vs. 2.7). Wayne and Jackson counties both had mortality rates 1.28 times higher than the state. [MOCPN 2003]

Figure 2: Age-adjusted oral cancer mortality per 100,000 persons in Michigan, 1991-2000, by county (Data is not available for all counties)



Epidemiology of Oral Cancer in Michigan, 2003

In Michigan, as is observed nationwide, African Americans are more likely than whites to develop oral cancer and much more likely to die from it. Cigarette smoking and alcohol are the major known risk factors for oral cancer in the United States, accounting for more than 75% of these cancers [Blot et al. 1988]. Using other forms of tobacco, including smokeless tobacco [USDHHS 1986; IARC 2005] and cigars [Shanks & Burns 1998] also increases the risk for oral cancer.

Dietary factors, particularly low consumption of fruit, and some types of viral infections also have been implicated as risk factors for oral cancer [McLaughlin et al. 1998; De Stefani et al. 1999; Levi 1999; Morse et al. 2000; Phelan 2003; Herrero 2003]. Radiation from sun exposure is a risk factor for lip cancer [Silverman et al. 1998].

Based on available evidence that early diagnosis of oral cancer improves its prognosis, several *Healthy People 2010* objectives specifically address early detection of oral cancer: Objective 21-6 is to "Increase the proportion of oral and pharyngeal cancers detected at the earliest stage," and Objective 21-7 is to "Increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancer" [USDHHS 2000]. Table VII presents data for Michigan and the United States on the proportion of oral cancer cases detected at the earliest stage (stage I, localized). In Michigan, only 40% of those with oral cancer were diagnosed when the cancer was still localized.

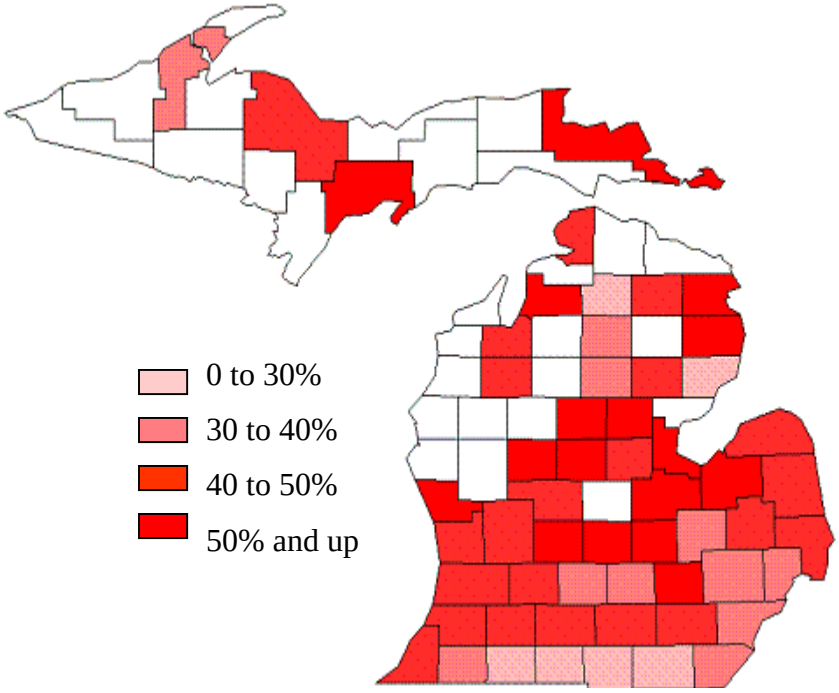
Table VII: Proportion of oral cancer cases detected at the earliest stage, by selected demographic characteristics, 1996-2000

	Michigan (%)	United States (%)
Healthy People 2010 Target	50%	50%
Total	40%	35%
By Race/Ethnicity		
American Indian/Alaska Native	DNA	24%
Asian/Pacific Islander	DNA	27%
Black non-Hispanic	DNA	21%
Hispanic/Latino	DNA	35%
White non-Hispanic	DNA	38%
By Sex		
Female	DNA	40%
Male	DNA	33%

DNA = Data Not Available

Early cancer detection between 1997-1999 was 39.5% in Michigan and 35.6% in Metropolitan Detroit. Early detection rates have not improved since 1992 and instead are slightly lower in 1997-99 than they were in 1990-1992. (40.5% Michigan, 36.2% Detroit) Figure 3 shows the percentage of oral cancers diagnosed at an early stage by county between 1997 and 1999. [MOCPN 2003]

Figure 3: Percentage of oral cancers in Michigan detected at an early stage (localized, in situ), 1997-1999, by county. (Data is not available in all counties)



Epidemiology of Oral Cancer in Michigan, 2003

Societal Impact

Social Impact

Oral health is related to well-being and quality of life as measured along functional, psychosocial, and economic dimensions. Diet, nutrition, sleep, psychological status, social interaction, school, and work are affected by impaired oral and craniofacial health. Oral and craniofacial diseases and conditions contribute to compromised ability to bite, chew, and swallow foods therefore limiting food selection and leading to poor nutrition. These conditions include tooth loss, diminished salivary functions, oral-facial pain conditions such as temporomandibular disorders, alterations in taste, and functional limitations of prosthetic replacements. Oral-facial pain, as a symptom of untreated dental and oral problems and as a condition itself, is a major source of diminished quality of life. It is associated with sleep deprivation, depression, and multiple adverse psychosocial outcomes.

More than any other body part, the face bears the stamp of individual identity. Appearance has an important effect on psychological development and social relationships. Considering the importance of the mouth and teeth in verbal and nonverbal communication, diseases that disrupt their functions are likely to damage self-image and alter the ability to sustain and build social relationships. The social functions of individuals encompass a variety of roles, from intimate interpersonal contacts to participation in social or community activities. Dental diseases and disorders can interfere with these social roles at any or all levels. Whether because of social embarrassment or functional problems, people with oral conditions may avoid conversation or laughing, smiling, or other nonverbal expressions that show their mouth and teeth.

Economic Impact

Direct Costs of Oral Diseases

Expenditures for dental services in the United States in 2003 were $74.3 billion, 3% of the total amount spent on health care services that year [Centers for Medicare & Medicaid Services 2004]. In Michigan FY2002, $62.8 million were spent on dental services, representing 1% of Medicaid health care expenditures in Michigan.

A large proportion of dental care is paid out-of-pocket by patients. Nationally in 2003, 44% of dental care was paid out-of-pocket, 49% was paid by private dental insurance, and 7% was paid by federal or state government sources. In comparison, 10% of physician and clinical services were paid out-of pocket, 50% were covered by private medical insurance, and 33% were paid by government sources [Centers for Medicare & Medicaid Services, Office of the Actuary, National Health Statistics Group 2005.]

Indirect Costs of Oral Diseases

Oral and craniofacial diseases and their treatment place a burden on society in the form of lost days and years of productive work. In 1996, the most recent year for which national data are available, U.S. school children missed a total of 1.6 million days of schools due to acute dental conditions, or more than 3 days for every 100 students [USDHHS 2000a]. Acute dental conditions were responsible for more than 2.4 million days of work loss, and contributed to a range of problems for employed adults, including restricted activity and bed days. In addition, conditions such as oral and pharyngeal cancers contribute to premature death and can be measured by years of life lost.

Oral Disease and Other Health Conditions

Oral health and general health are intimately associated with each other. Many systemic diseases and conditions have oral signs and symptoms, and these

manifestations may be the initial sign of clinical disease and therefore may serve to inform health care providers and individuals of the need for further assessment. The oral cavity is a portal of entry as well as the site of disease for bacterial and viral infections that affect general health status. Recent research suggests that inflammation associated with periodontitis may increase the risk for heart disease and stroke, premature births in some females, difficulty in controlling blood sugar in people with diabetes, and respiratory infection in susceptible individuals [Dasanayake 1998; Offenbacher et al. 2001; Davenport et al. 1998; Beck et al. 1998; Scannapieco et al. 2003; Taylor 2001]. More research is needed in these areas.

Diabetes and Oral Health

Diabetes exacerbates gingival inflammation and periodontal disease, furthering the damage and destruction caused by infectious processes on the teeth and gums. As a result, persons with diabetes were more likely than those without diabetes to have lost 6 or more teeth (41.8% vs. 15.2%). On the positive side, diabetics in Michigan have become increasingly likely to visit a dentist. The percentage of diabetics, age 40+ years, visiting the dentist annually has increased from 57% in 1996 to 70% in 2002. In addition, the percentage of diabetics in Michigan, age 40+ years, having lost 6 or more teeth has declined from 52% in 1996 to 42% in 2002. [CDC 1996; CDC 2002b]

Disparities

Racial and Ethnic Groups

Although there have been gains in oral health status for the population as a whole, they have not been evenly distributed across subpopulations. Non-Hispanic blacks, Hispanics, and American Indians and Alaska Natives generally have the poorest oral health of any of the racial and ethnic groups in the U.S. population. As reported above, these groups tend to be more likely than non-Hispanic whites to experience dental caries, are less likely to have received treatment for it, and have more extensive tooth loss. African-American adults in each age group are more likely other racial/ethnic groups to have gum disease. Compared to White Americans, African Americans are more likely to develop oral or pharyngeal cancer, are less likely to have it diagnosed at early stages, and suffer a worse 5-year survival rate.

Racial disparities in oral health for Michigan mimic those nationally. Black non-Hispanics are more likely to have tooth loss and be edentulous than whites. African American males have both the highest incidence of oral cancer and the highest mortality due to oral cancer. African Americans are also less likely to have visited the dentist in the past year, have their teeth cleaned in the past year,

and received sealants on their first molars. Hispanics are more likely to have sealants on first molars than blacks, but still are less likely than whites to have them. Hispanics also have the highest rate of inappropriate bottle use, putting their children at increased risk for early childhood caries.

Women's Health

Most oral diseases and conditions are complex and represent the product of interactions between genetic, socioeconomic, behavioral, environmental, and general health influences. Multiple factors may act synergistically to place some women at higher risk for oral diseases. For example, the comparative longevity of women, compromised physical status over time, and the combined effects of multiple chronic conditions often with multiple medications, can result in increased risk of oral disease [Redford 1993]. Many women live in poverty, are not insured, and are the sole head of their household. For these women, obtaining needed oral health care may be difficult. In addition, gender-role expectations of women may affect their interaction with dental care providers and could affect treatment recommendations as well.

Many, but not all, statistical indicators show women to have better oral health status as compared to men [Redford 1993; USDHHS 2000a]. Adult females are less likely than males at each age group to have severe periodontal disease. Both black and white females have a substantially lower incidence rate of oral and pharyngeal cancers compared to black and white males, respectively. However, a higher proportion of women than men have oral-facial pain, including pain from oral sores, jaw joints, face/cheek, and burning mouth syndrome.

In Michigan, women have been shown to have lower incidence rates of oral cancer. Women in Michigan have tooth loss rates similar to men. However, women in Detroit have higher rates of tooth loss than women across Michigan.

People with Disabilities

The oral health problems of individuals with disabilities are complex. These problems may be due to underlying congenital anomalies as well as the inability to receive the personal and professional health care needed to maintain oral health. There are more than 54 million individuals defined as disabled under the Americans with Disabilities Act, including almost a million children under age 6 and 4.5 million children between 6 and 16 years of age.

No national studies have been conducted to determine the prevalence of oral and craniofacial diseases among the various populations with disabilities. Several smaller-scale studies show that the population with mental retardation or other developmental disabilities has significantly higher rates of poor oral hygiene and needs for periodontal disease treatment than the general population, due, in part,

to limitations in individual understanding of and physical ability to perform personal prevention practices or to obtain needed services. There is a wide range of caries rates among people with disabilities, but overall their caries rates are higher than those of people without disabilities [USDHHS 2000a].

The 2001 National Survey of Children with Special Health Care Needs (CSHCN), found 83% of Michigan CSHCN needed dental services during the past year and 93% of those received the dental service they needed, leaving 7% with unmet needs. [CDC 2001] The 2003 National Survey of Children's Health found 9% of Michigan CSHCN had an unmet need for preventive dental services. [CDC 2003]

Socioeconomic Disparities

Low-income families bear a disproportionate burden from oral diseases and conditions. For example, despite progress in reducing dental caries in the United States, individuals in families living below the poverty level experience more dental decay than those who are economically better off. Furthermore, the caries seen in these individuals is more likely to be untreated than caries in those living above the poverty level. Nationally, 37% of poor children aged 2 to 9 have one or more untreated decayed primary teeth, compared to 17% of nonpoor children [USDHHS 2000a]. Poor adolescents aged 12 to 17 in each racial/ethnic group have a higher percentage of untreated decayed permanent teeth than the corresponding nonpoor adolescent group. Adult populations show a similar pattern, with the proportion of untreated decayed teeth higher among the poor than the nonpoor. At every age, a higher proportion of those at the lowest income level have periodontitis than those at higher income levels. Adults with some college (15%) have 2 to 2.5 times less destructive periodontal disease than those with high school (28%) and with less than a high school (35%) education (USDHHS 2000b). Overall, a higher percentage of Americans living below the poverty level are edentulous than are those living above [USDHHS 2000a]. Among persons aged 65 years and older, 39% of persons with less than a high school education were edentulous (had lost all their natural teeth) in 1997, compared with 13 percent of persons with at least some college [USDHHS 2000b]. People living in rural areas also have a higher disease burden due primarily to difficulties in accessing preventive and treatment services.

People of low socioeconomic status in Michigan bear similar oral health burdens as their national counterparts. Those in poverty are less likely to have visited a dentist in the past year or have had their teeth cleaned. Those with high school educations or less are also less likely to visit a dentist either for treatment or preventive services. For both those at low-income and low-education levels, tooth loss appears at much higher rates.

RISK AND PROTECTIVE FACTORS FOR ORAL DISEASES

The most common oral diseases and conditions can be prevented. There are safe and effective measures that can reduce the incidence of oral disease, reduce disparities, and increase quality of life.

Community Water Fluoridation

Grand Rapids, Michigan was the birthplace of community water fluoridation for the world, and this preventive practice has since been recognized as one of the 10 great achievements in public health of the 20th century [CDC 1999a]. Community water fluoridation is the process of adjusting the natural fluoride concentration of a community's water supply to a level that is best for the prevention of dental caries. In the United States, community water fluoridation has been the basis for the primary prevention of dental caries for 60 years [CDC 1999a]. It is an ideal public health method because it is effective, eminently safe, inexpensive, requires no behavior change by individuals, and does not depend on access or availability of professional services. Water fluoridation reduces or eliminates disparities in preventing dental caries among different socioeconomic, racial, and ethnic groups. Fluoridation helps to lower the cost of dental care and dental insurance and helps residents retain their teeth throughout life [USDHHS 2000a].

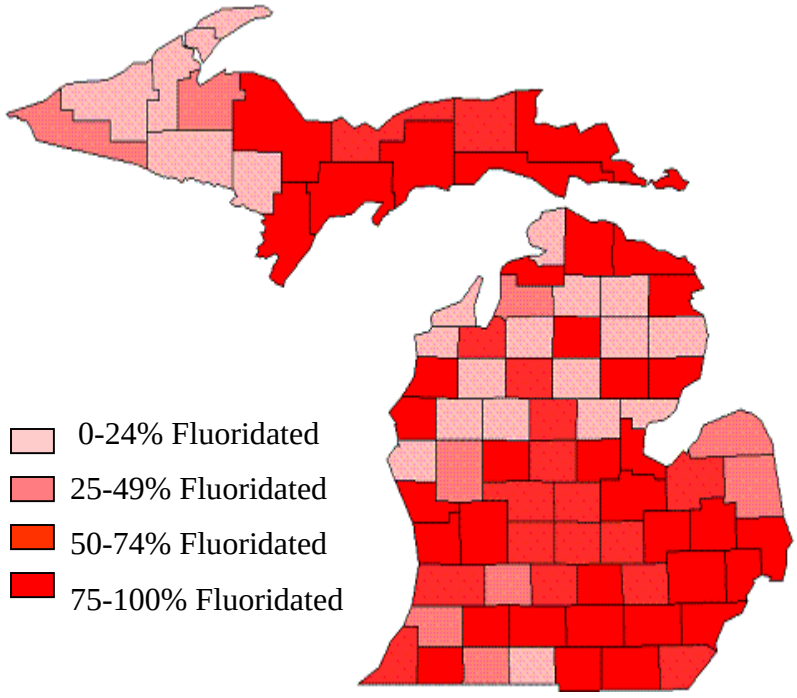
Recognizing the importance of community water fluoridation, *Healthy People 2010* Objective 21-9 aims to "Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water to 75%." In the United States during 2002, approximately 162 million people (67% of the population served by public water systems) received optimally fluoridated water [CDC 2004]. 73% of Michigan residents are served by community water supplies. In Michigan, approximately 6.3 million people received optimally fluoridated water in 2004, representing 87% of the population served by public water systems.

Not only does community water fluoridation effectively prevent dental caries, it is one of very few public health prevention measures that offers significant cost saving in almost all communities [Griffin et al. 2001]. About every $1 invested in community water fluoridation saves $38 in averted costs. The cost per person of instituting and maintaining a water fluoridation program in a community decreases with increasing population size.

While Michigan exceeds the level of fluoridation set forth by HP2010, there are geographic disparities in community water fluoridation. Fluoridation is at its highest in the Southern Lower Peninsula and the Eastern Upper Peninsula. Conversely, fluoridation is relatively low in the Northern Lower Peninsula and

the Western Upper Peninsula. Wells drilled for private use are currently untested for fluoride.

Figure 4: Percentage of persons served by community water supplies that receive fluoridated water, by county



Department of Environmental Quality, 2004

Topical Fluorides and Fluoride Supplements

Because frequent exposure to small amounts of fluoride each day best reduces the risk for dental caries in all age groups, all people should drink water with an optimal fluoride concentration and brush their teeth twice daily with fluoride toothpaste [CDC 2001]. For communities that do not receive fluoridated water and persons at high risk for dental caries, additional fluoride measures might be needed. Community measures include fluoride mouth rinse or tablet programs, typically conducted in schools. Individual measures include professionally applied topical fluoride gels or varnishes for persons at high risk for caries.

Participation in Michigan's fluoride mouth rinse program is completely voluntary. The number of school children participating in this program has declined from 20,444 in the 2000-2001 school year to 16,324 in the 2002-03 school year. This decline has occurred primarily through a decrease in the number of schools participating in the program.

Dental Sealants

Since the early 1970s, childhood dental caries on smooth tooth surfaces (those without pits and fissures) has declined markedly because of widespread exposure to fluorides. Most decay among school-aged children now occurs on tooth surfaces with pits and fissures, particularly the molar teeth.

Pit-and-fissure dental sealants—plastic coatings bonded to susceptible tooth surfaces—have been approved for use for many years and have been recommended by professional health associations and public health agencies. First permanent molars erupt into the mouth at about age 6 years. Placing sealants on these teeth shortly after their eruption protects them from the development of caries in areas of the teeth where food and bacteria are retained. If sealants were applied routinely to susceptible tooth surfaces in conjunction with the appropriate use of fluoride, most tooth decay in children could be prevented [USDHHS 2000b]

Second permanent molars erupt into the mouth at about age 12 to 13 years. Pit-and-fissure surfaces of these teeth are as susceptible to dental caries as the first permanent molars of younger children. Therefore, young teenagers need dental sealants shortly after the eruption of their second permanent molars.

The *Healthy People 2010* target for dental sealants on molars is 50% for 8-year-olds and 14-year-olds. Table VII presents the most recent estimates of the proportion of children aged 8 with dental sealants on one or more molars. Nationally, dental sealants are less prevalent among 14-year-olds than among 8-year-olds. Within each age group, African Americans and Mexican Americans are less likely than White non-Hispanics to have sealants. The prevalence of sealants also varies by the education level of the head of household.

Table VIII: Percentage of children in the US with dental sealants on molar teeth, by age and selected characteristics, 1999-2000

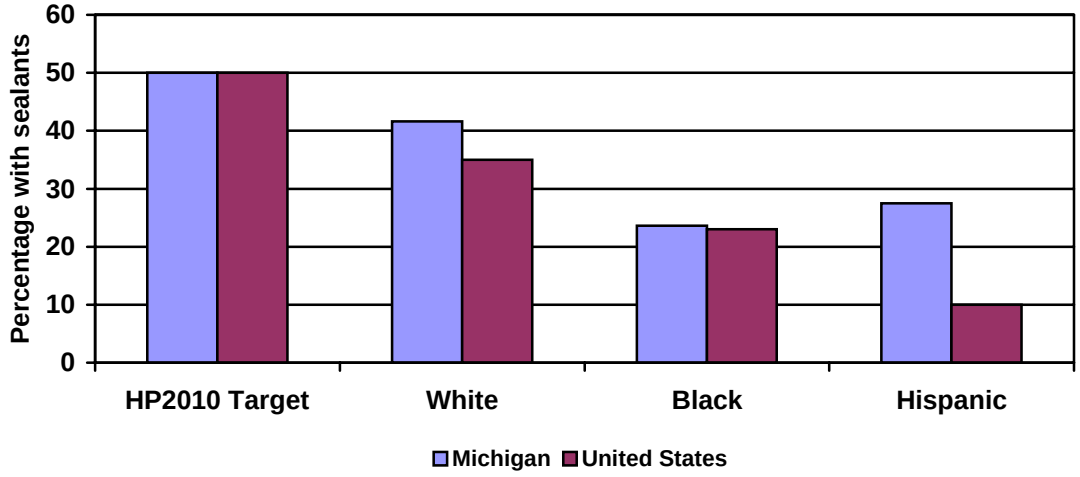
	Age 8 years	Age 14 years
	United States (%)	United States (%)
Healthy People 2010 Target	50%	50%
Total	28%	14%
By Race/Ethnicity		
American Indian/Alaska Native	55%[a]	42%[a]
Native Hawaiian/Pacific Islander	20%[b]	DNA
Black non-Hispanic	23%[c]	14%[c]
White non-Hispanic	35%[c]	16%[c]
Mexican American	10%[c]	7%[c]

Table VIII: Percentage of children in the US with dental sealants on molar teeth, by age and selected characteristics, 1999-2000, continued		
	Age 8 years	Age 14 years
	United States (%)	United States (%)
By Sex		
Female	31%	12%
Male	25%	17%
By Parent Education Level		
Less than high school	17%[c]	4%[c]
High school graduate	12%[c]	6%[c]
At least some college	35%[c]	28%[c]

DNA = Data Not Available
[a] Indian Health Service, 1999
[b] Data are from Hawaii, 1999
[c] NHANES III, 1988-1994

Figure 5 describes the presence of sealants on first molars as reported by the child's parents. Michigan has a higher overall prevalence of sealant placement than the nation, but still fails to meet the HP2010 goal of 50%. The disparity between Michigan Hispanic populations and the Michigan non-Hispanic white population is far less pronounced than the racial disparity nationally.

Figure 5: Percentage of Michigan and US children, age 8 to 9, with sealants applied to first molars, by race, in 2003.



Preventive Visits

Maintaining good oral health requires ongoing efforts from the individual, caregivers, and health care providers. Daily oral hygiene routines and healthy lifestyle behaviors play an important role in prevention of oral diseases. Regular preventive dental care can reduce the development of disease and facilitate early diagnosis and treatment. One measure of preventive care that is being tracked is the percentage of people (adults) who had their teeth cleaned in the past year. Table IX describes teeth cleaning among adults in both Michigan and the United States.

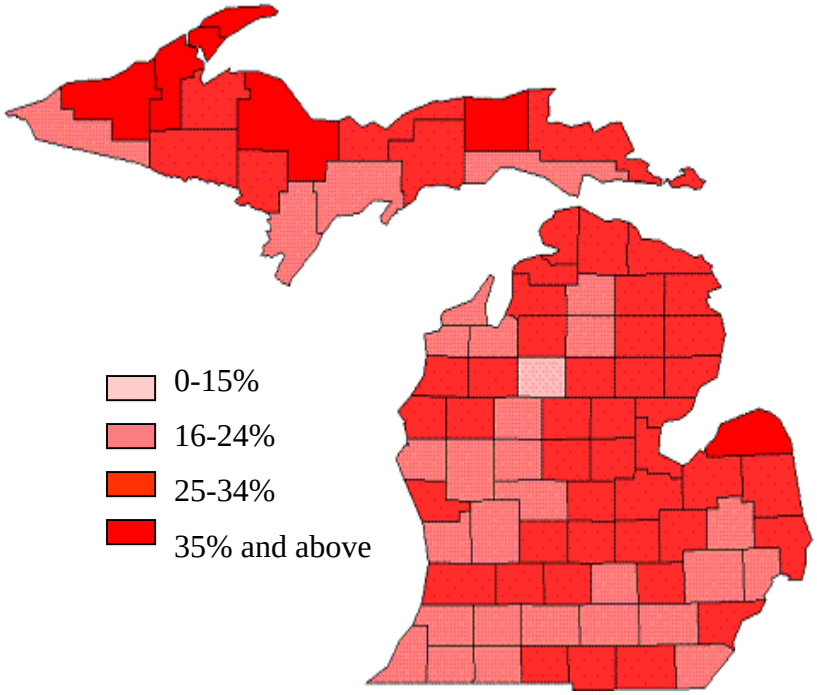
Table IX: Percentage of adults who had their teeth cleaned within the past year ages 25 or higher, BRFSS 2002

	United States (%)	Michigan (%)
Total	69%	76%
By Race		
Black non-Hispanic	62%	66%
White non-Hispanic	72%	79%
By Sex		
Female	72%	78%
Male	67%	75%
By Education Level		
Less than high school	47%	53%
High school graduate	65%	72%
At least some college	75%	82%

Utilization of Dental Services

Primary prevention of tooth decay or other oral disease conditions requires access and use of preventive services. Secondary prevention in oral health primarily relies on the treatment of tooth decay. Due to shortages of Medicaid dental providers, an access gap arises in the percentage of persons receiving services based on their type of insurance coverage. In 2002, just 23% of Medicaid children visited the dentist and only 21% visited the dentist for preventive care. Children covered by private insurance are more likely to have received any dental service than children under Medicaid, most importantly preventive services. Figure 6 demonstrates the low rate of utilization for Medicaid preventive services, by county in 2002.

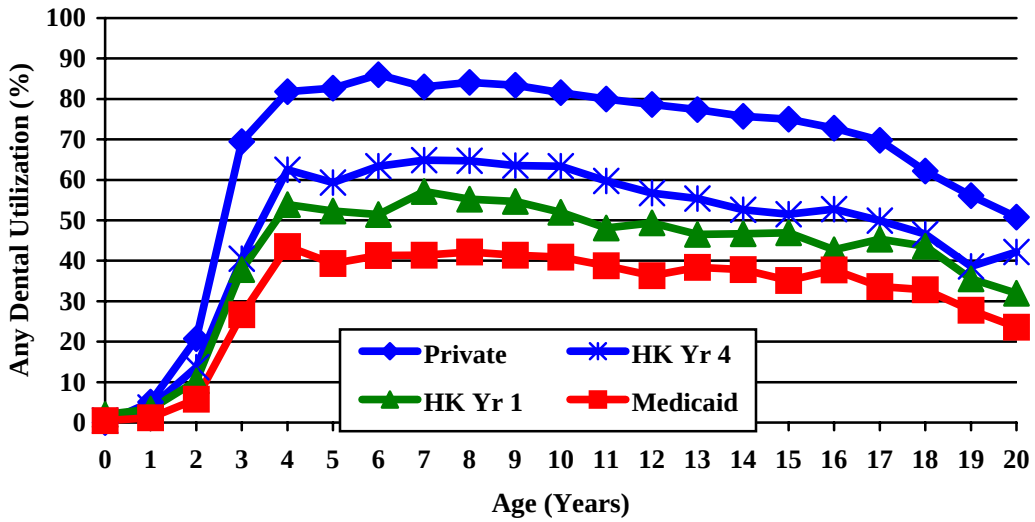
Figure 6: Proportion of Medicaid-enrolled children, ages 0 to 19, with a preventive dental visit in the past year, 2002



Healthy Kids Dental, a Medicaid funded program administered through Delta Dental, has alleviated certain barriers to care. Through increased reimbursement rates and removing administrative barriers, 33% more Medicaid children in the Healthy Kids Dental counties received dental services during the first year of its implementation. Figure 7 demonstrates the improvements in access to dental care made through the Healthy Kids Dental program at both its first and fourth year of implementation.

As for adults, three out of four report having visited the dentist in the past year [CDC, 2002c]. Nearly an equal amount report having their teeth cleaned in the past year. Meanwhile, 30% of at-home long-term care residents were in need of dental services in 2003. [MDCH 2003]

Figure 7: HKD annual utilization by age, 12 month enrollment beginning Oct 2003 to Sept 2004



Tobacco Control

Use of tobacco has a devastating impact on the health and well-being of the public. More than 400,000 Americans die each year as a direct result of cigarette smoking, making it the nation's leading preventable cause of premature mortality, and smoking caused over $150 billion in annual health-related economic losses [CDC 2002b]. The effects of tobacco use on the public's oral health are alarming. The use of any form of tobacco – including cigarettes, cigars, pipes, and smokeless tobacco – has been established as a major cause of oral and pharyngeal cancer [USDHHS 2004a]. The evidence is sufficient to consider smoking a causal factor for adult periodontitis [USDHHS 2004a]; one-half of the cases of periodontal disease in this country may be attributable to cigarette smoking [Tomar & Asma 2000]. Tobacco use substantially worsens the prognosis of periodontal therapy and dental implants, impairs oral wound healing, and increases the risk for a wide range of oral soft tissue changes [Christen et al. 1991; AAP 1999].

The goal of comprehensive tobacco control programs is to reduce disease, disability, and death related to tobacco use by

- Preventing the initiation of tobacco use among young people.
- Promoting quitting among young people and adults.
- Eliminating nonsmokers' exposure to secondhand tobacco smoke.
- Identifying and eliminating the disparities related to tobacco use and its effects among different population groups.

Comprehensive tobacco control also would have a large impact on oral health status.

In 2003, Michigan stakeholders developed a 5-year plan aimed at building upon past tobacco-related achievements and continuing to develop evidence-based practices. This plan included increasing the cost of cigarettes, increasing the number of clean air environments, implementing quit-lines, tobacco cessation opportunities, and a media campaign to encourage quitting tobacco. In FY2004, the tobacco tax was increased from $1.25 to $2.00 per pack of 20 cigarettes, which is currently the 2nd highest among all states.

The dental office provides an excellent venue for providing tobacco intervention services. More than one-half of adult smokers see a dentist each year [Tomar et al. 1996] as do nearly three-quarters of adolescents [NCHS 2004]. Dental patients are particularly receptive to health messages at periodic check-up visits, and oral effects of tobacco use provide visible evidence and a strong motivation for tobacco users to quit. Because dentists and dental hygienists can be effective in treating tobacco use and dependence, the identification, documentation, and treatment of every tobacco user they see needs to become a routine practice in every dental office and clinic [Fiore et al. 2000]. However, national data from the early 1990s indicated that just 24 percent of smokers who had seen a dentist in the past year reported that their dentist advised them to quit, and only 18 percent of smokeless tobacco users reported that their dentist *ever* advised them to quit.

Oral Health Education

Oral health education for the community is a process that informs, motivates, and helps people to adopt and maintain beneficial health practices and lifestyles; advocates environmental changes as needed to facilitate this goal; and conducts professional training and research to the same end [Kressin and DeSouza 2003]. Although health information or knowledge alone does not necessarily lead to desirable health behaviors, knowledge may empower people and communities to take action to protect their health.

There are no formal oral health education programs currently administered by the State of Michigan, however there are many educational programs instituted at the community and clinic level. Oral health education is typically performed at the dental office during the regular dental visit. In addition, community college dental hygiene students provide community oral health education through elementary classroom teaching and population-based education. For example, community college projects include providing oral health care to long-term care staff and residents. Community dental, dental hygiene, and dental

assisting societies provide oral health education to classrooms and to groups such as Head Start. The "Sip All Day Get Decay" publicity campaign was launched by the Michigan Dental Association to encourage public awareness of the relationship between high incidence of caries and soda pop. The University of Michigan is launching a billboard campaign to improve oral cancer awareness. The Central District Dental Society and the Oral Health Task Force recently started a "Baby Bottle Tooth Decay" campaign in Ingham County. These are just a few examples of oral health education campaigns currently delivered within Michigan communities.

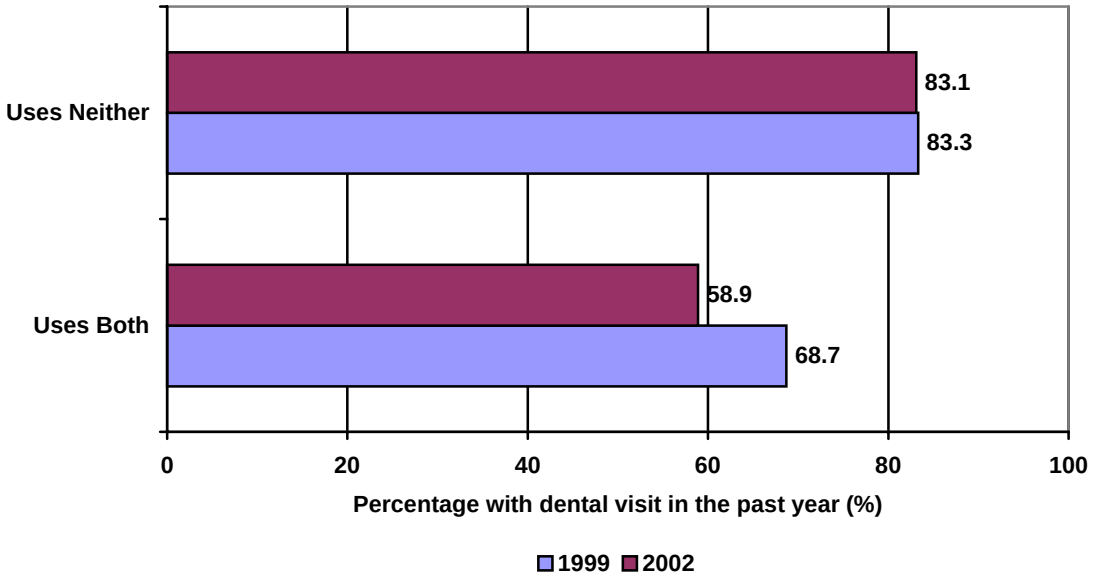
Screening for Oral Cancer

Oral cancer detection is accomplished by a thorough examination of the head and neck and an examination of the mouth including the tongue and the entire oral and pharyngeal mucosal tissues, lips, and palpation of the lymph nodes. Although the sensitivity and specificity of the oral cancer examination have not been established in clinical studies, most experts consider early detection and treatment of precancerous lesions and diagnosis of oral cancer at localized stages to be the major approaches for secondary prevention of these cancers [Silverman 1998; Johnson 1999; CDC 1998]. If suspicious tissues are detected during examination, definitive diagnostic tests are needed, such as biopsies, to confirm diagnosis.

Oral cancer is more common after age 60. Known risk factors include use of tobacco products and alcohol. The risk of oral cancer is increased 6 to 28 times in current smokers. Alcohol consumption is an independent risk factor and, when combined with the use of tobacco products, accounts for most cases of oral cancer in the United States and elsewhere [USDHHS 2004]. Individuals also should be advised to avoid other potential carcinogens, such as exposure to sunlight (risk factor for lip cancer) without protection (use of lip sunscreen and hats recommended).

Figure 8 compares adults over the age of 40 with both of the primary preventable risk factors for oral cancer, current smoker and excessive alcohol user, to those adults over the age of 40 with neither of the primary preventable risk factors. This figure demonstrates that those most at risk for oral cancer are less likely to visit the dentist and in all likelihood are less likely to be screened for oral cancer as well.

Figure 8: Percentage of adults age 40 and above with a dental visit in the past year, by excessive alcohol use and current smoking status, BRFSS 1999 & 2002



Recognizing the need for dental and medical providers to examine adults for oral and pharyngeal cancer, *Healthy People 2010* Objective 21-7 is to increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers. Nationally, relatively few adults aged 40 years and older (13%) reported receiving an examination for oral and pharyngeal cancer, although the proportion varied by race/ethnicity (TABLE X).

Table X: Proportion of adults in 1998, in the US and Michigan that were examined for oral and pharyngeal cancer in the preceding 12 months

	Oral and Pharyngeal Cancer Examination in the past 12 months	
	United States (%)	Michigan (%)
Healthy People 2010 Target	20%	20%
Total	13%	DNA
By Race/Ethnicity		
Asian	12%	DNA
Black non-Hispanic	7%	DNA
White non-Hispanic	15%	DNA
Hispanic/Latino	6%	DNA

Table X: Proportion of adults in 1998, in the US and Michigan that were examined for oral and pharyngeal cancer in the preceding 12 months, continued		
	Oral and Pharyngeal Cancer Examination in the past 12 months	
	United States (%)	Michigan (%)
By Sex		
Female	14%	DNA
Male	13%	DNA
By Education Level		
Less than high school	5%	DNA
High school graduate	10%	DNA
At least some college	19%	DNA

DNA = Data Not Available

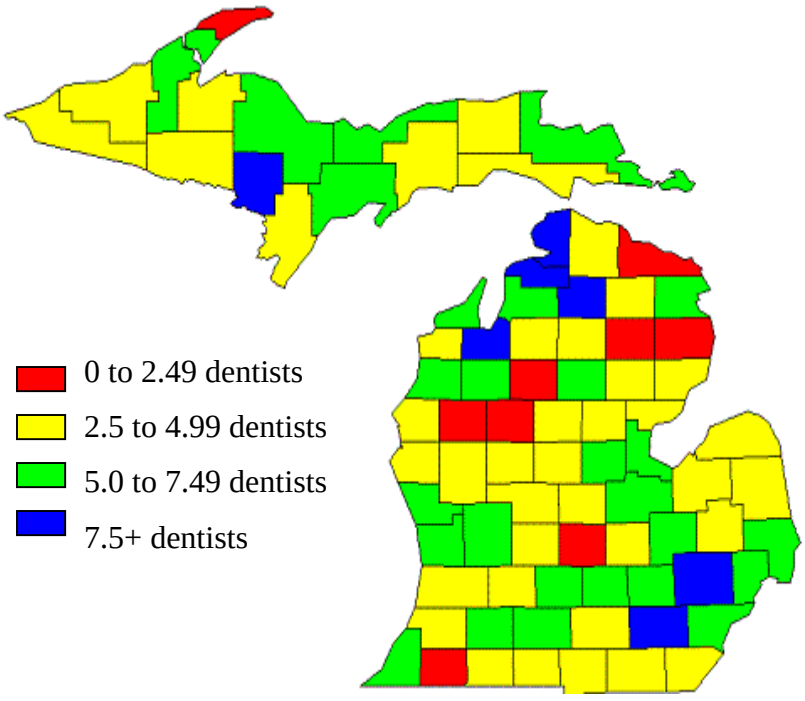
PROVISION OF DENTAL SERVICES

Dental Workforce and Capacity

The oral health care workforce is critical to society's ability to deliver high quality dental care in Michigan and across the United States. Effective health policies intended to expand access, improve quality or constrain costs must take into consideration the supply, distribution, preparation and utilization of the health workforce.

Treatment of oral disease begins with availability to oral health professionals. There were 7,598 dentists licensed by Michigan in 2004, of which 6,444 had addresses within the state. There were 9,275 dental hygienists licensed by the state, of which 8,279 had addresses within the state. Figure 9 shows the dental provider density by county in Michigan.

Figure 9: Number of licensed dentists with a current Michigan address per 10,000 population, by county, 2004

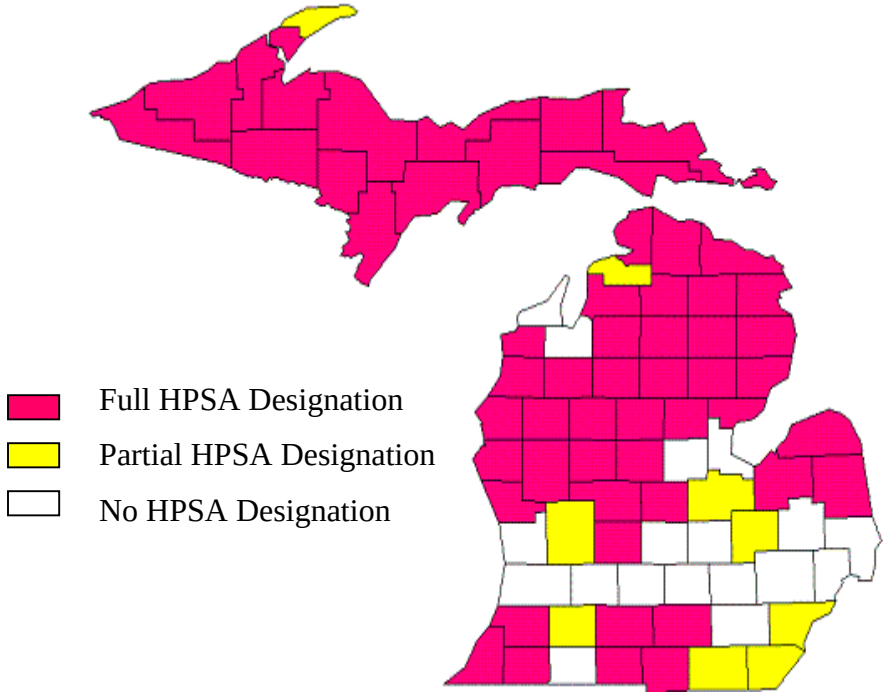


Bureau of Licensing & Health Professions

1,933 (30.0%) of the 6,444 dentists were enrolled as Medicaid providers. However only 1,592 of the 6,444 (24.7%) dentists had at least one claim for Medicaid, and just 552 (8.6%) could be considered as critical access providers, or

having Medicaid claims totaling $10,000 or greater (The equivalent of 3-4 Medicaid child visits per week). Currently, only one county in Michigan lacks a dentist. However, eleven out of 83 counties have less than five dentists. Figure 10 shows county health provider shortage area (HPSA) designations as they relate to the provision of dental services. 65 of Michigan's 83 counties qualified as either fully or partially designated as a dental shortage area in 2004. A HPSA designation may result from inadequate providers for the entire county as well as inadequate providers for certain demographic groups such as low-income persons or certain ethnic and racial populations.

Figure 10: Health Provider Shortage Area designations for the provision of dental services, by county, 2004



Health Resources & Services Administration

Dental Educational Institutions

Accredited dental education institutions in Michigan include two dental schools, twelve dental hygiene programs and six dental assisting programs. The University of Detroit Mercy has a Doctor of Dental Surgery (DDS) program and specialty graduate programs in endodontics, orthodontics, periodontics, and Advanced Education in General Dentistry (AEGD) programs. The University of Michigan offers a DDS program and specialty graduate programs in oral health

sciences, prosthodontics, endodontics, restorative dentistry, orthodontics, pediatric dentistry, periodontics, and dental public health. The University of Detroit Mercy offers a baccalaureate degree completion program and the University of Michigan offers a graduate degree program for dental hygiene. The 6 dental assisting programs are a minimum of one year in length; however, many dental assistants are taught with on-the-job education. In 2002-03, there were 182 first year predoctoral dental students [ADA 2003a]. During this same time period there were 346 first year dental hygiene students and 199 first year dental assistant students [ADA 2003b]

Dental Workforce Diversity

One cause of oral health disparities is lack of access to oral health services among under-represented minorities. Increasing the number of dental professionals from under-represented racial and ethnic groups is viewed as an integral part of the solution to improving access to care [HP2010]. Data on the race/ethnicity of dental care providers were derived from surveys of professionally active dentists conducted by the American Dental Association [ADA 1999]. In 1997, 1.9% of active dentists in the United States identified themselves as black or African American, although that group comprised 12.1% of the U.S. population. Hispanic/Latino dentists comprised 2.7% of U.S. dentists, compared to 10.9% of the U.S. population that was Hispanic/Latino.

Use of Dental Services

General Population

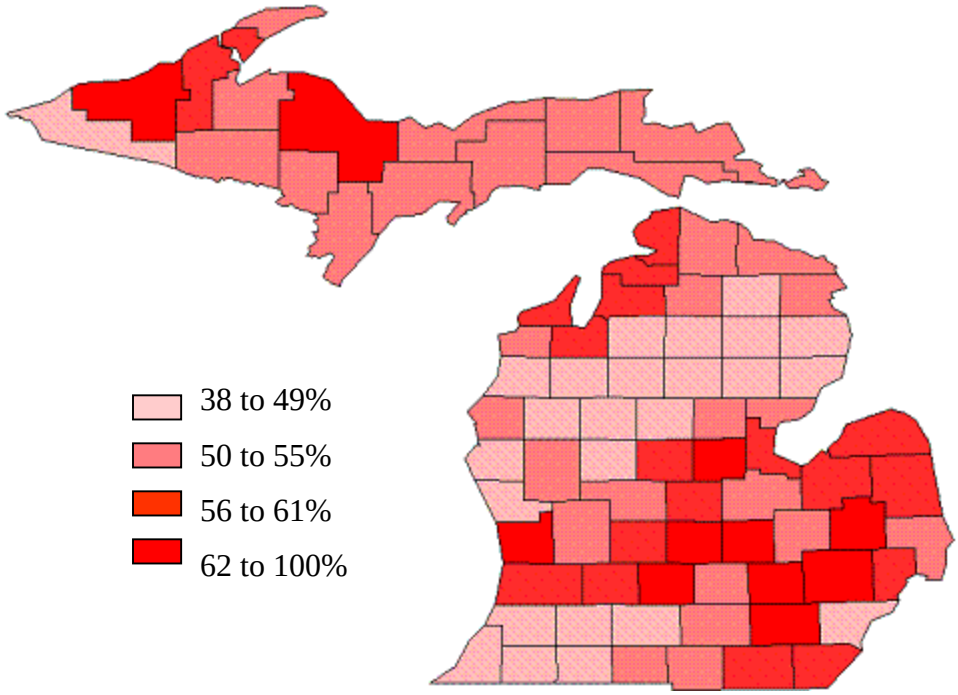
Although appropriate home oral health care and population-based prevention are essential, professional care also is necessary to maintain optimal dental health. Regular dental visits provide an opportunity for the early diagnosis, prevention, and treatment of oral diseases and conditions for people of all ages, as well as for the assessment of self-care practices.

Adults who do not receive regular professional care can develop oral diseases that eventually require complex treatment and may lead to tooth loss and health problems. People who have lost all their natural teeth are less likely to seek periodic dental care than those with teeth, which, in turn, decreases the likelihood of early detection of oral cancer or soft tissue lesions from medications, medical conditions, and tobacco use, as well as from poor fitting or poorly maintained dentures.

Table XI: Proportion of persons aged 18 years and older who visited a dentist in the previous 12 months, BRFSS 2002		
	Dental visit in the previous year	
	United States (%)	Michigan (%)
Healthy People 2010 Target	56%	56%
Total	69%	76%
By Race/Ethnicity		
American Indian/Alaska Native	DNA	DNA
Asian/Pacific Islander	DNA	DNA
Black non-Hispanic	66%	65%
Hispanic/Latino	66%	DNA
White non-Hispanic	72%	79%
By Sex		
Female	72%	77%
Male	68%	75%
By Education Level		
Less than high school	47%	51%
High school graduate	65%	72%
At least some college	76%	83%

DNA = Data Not Available

Figure 12: Estimated percentage of children age 0-19 with any dental visit within the past year, by county in 2002



Health Insurance Coverage in Michigan

According to the 2003 Michigan Child Dental Coverage Validation Survey, 84.4% of persons under the age of 20 have some form of dental insurance in Michigan. Employer-based coverage insured 57.3%, Medicaid and other government programs insured 24.4%, yet 15.6 % of children still had no dental insurance. Nearly half of persons age 18-19 had interruptions in dental coverage in the previous 12 months. 9.0% reported not being able to see the dentist due to cost. [Eklund 2003]

Medical insurance is a strong predictor of access to dental care. Uninsured children are 2.5 times less likely to visit a dentist and 3 times as likely to have dental health needs when compared to publicly or privately insured children. Medicaid, as a safety net for dental services, has been largely unable to address the needs of those who are publicly insured as well. Only 1 in 5 Medicaid children nationally have received preventive care at the dentist in the past year.

Special Populations

School Children

Questions regarding oral health behaviors have recently been added to Michigan's 2005 Youth Tobacco Survey. Results will provide information as to the preventive behaviors of middle school and high school students. Information will be available upon completion of analysis.

Pregnant Women

Studies documenting the effects of hormones on the oral health of pregnant women suggest that 25% to 100% of these women experience gingivitis and up to 10% may develop more serious oral infections [Amar & Chung 1994; Mealey 1996]. Recent evidence suggests that oral infections such as periodontitis during pregnancy may increase the risk for preterm or low birth weight deliveries [Offenbacher et al. 2001]. During pregnancy, a woman may be particularly amenable to disease prevention and health promotion interventions that could enhance her own health or that of her infant [Gaffield et al. 2001].

Questions regarding oral health behaviors in pregnant women have recently been added to Michigan's 2005 Pregnancy Risk Assessment Monitoring System (PRAMS). These questions address behaviors and unmet dental needs during pregnancy. Information will be available upon completion of analysis.

Medicaid Dental and MIChild

Medicaid is the primary source of health care for low-income families, elderly, and disabled people in the United States. This program became law in 1965 and is jointly funded by the Federal and State governments (including the District of Columbia and the Territories) to assist States in providing medical long-term care assistance to people who meet certain eligibility criteria. People who are not U.S. citizens can only get Medicaid to treat a life-threatening medical emergency. Eligibility is determined based on state and national criteria. Dental services are a required service for most Medicaid-eligible individuals under the age of 21, as a required component of the Early and Periodic Screening, Diagnostic and Treatment (EPSDT) benefit. Services must include at a minimum, relief of pain and infections, restoration of teeth and maintenance of dental health. Dental services may not be limited to emergency services for EPSDT recipients.

Nationally, federal Medicaid expenditures for Medicaid dental services totaled $2.3 billion in 2003, or 3% of the $74 billion spent on dental services nationally [Centers for Medicare and Medicaid Services 2004]. In Michigan, FY2003, $73.1 million was spent on Medicaid dental services, $42.6 million for children. In October 2003, the adult Medicaid dental benefit in Michigan was eliminated due to budget constraints. Consequently, In Michigan, FY2004, $54.2 million was spent on Medicaid dental services, $47.1 million on children. Medicaid covers preventive, emergency, and some restorative and surgical services for children, but only emergency services for adults. In addition, children enrolled in Michigan's Children's Special Health Care Services program are eligible for additional medically-related orthodontic, prosthodontic, or endodontic services. As of December 2004, there were 816,120 children ages 0-18 enrolled in Medicaid, an increase of roughly 35,000 compared to the prior year.

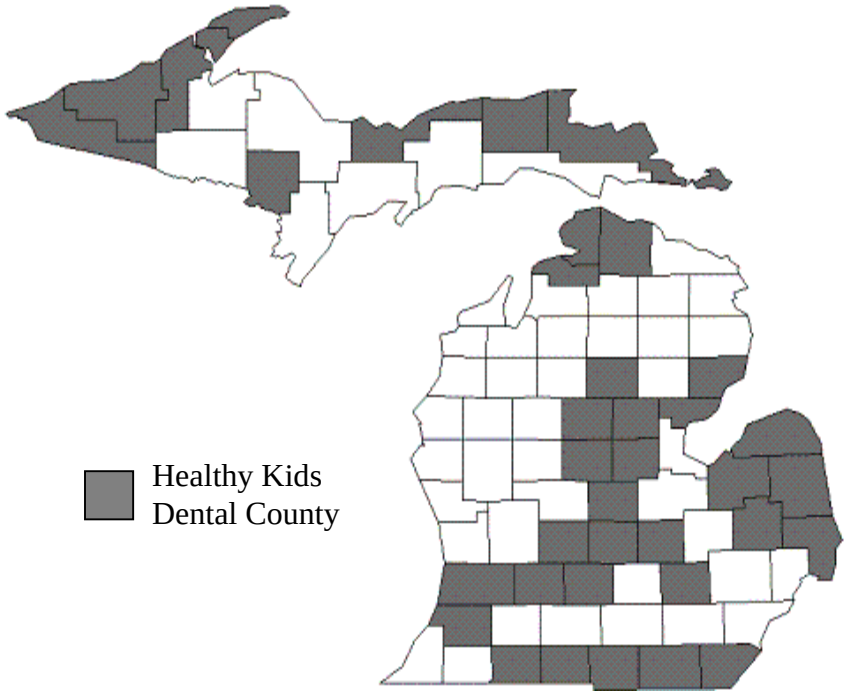
MIChild is a health coverage program using State funds as well as funds authorized under Title XXI of the Federal Social Security Act to furnish health care coverage to a targeted population. This population consists of individuals under age 19 who are not eligible for Medicaid, whose family income is above 150% and at or below 200% of the federal poverty level, and who do not have comprehensive health coverage. The state contracts with dental plans to provide covered dental services to MIChild beneficiaries on a per member per month capitation basis. As of November 2004, there were 34,209 children ages 0-18 enrolled in MI Child, a slight drop of roughly 1,000 children compared to the previous year.

Healthy Kids Dental

In May 2000, the Michigan Department of Community Health instituted the Healthy Kids Dental (HKD) project. HKD is administered through Delta Dental of Michigan and aims to eliminate two of the three barriers for dentist participation in Medicaid. Reimbursement levels in HKD are similar to those of Delta Dental, and administrative processes such as enrollment verification are done through Delta Dental instead of Medicaid.

The HKD program initially covered 22 primarily rural counties, but was expanded in October 2000 to include an additional 15 counties. The child's county of residence determines HKD eligibility, not the location of the dentist. This allows a HKD child to visit any participating dentist in the state. In the year prior to implementation of HKD, 32% of continuously-enrolled Medicaid children received dental care in these original 22 counties. Following the first year of HKD, that number had risen to 44%. [Eklund 2003]

Figure 13: Michigan Counties Served by the Healthy Kids Dental Program, 2005



Community & Migrant Health Centers & other State, County, and Local Programs

Community Health Centers (CHCs) provide family-oriented primary and preventive health care services for people living in rural and urban medically underserved communities. CHCs exist in areas where economic, geographic, or cultural barriers limit access to primary health care. The Migrant Health Program (MHP) supports the delivery of migrant health services, serving over 650,000 migrant and seasonal farm workers. Among other services provided, many CHCs and Migrant Health Centers provide dental care services.

Healthy People 2010 objective 21-14 is to "Increase the proportion of local health departments and community-based health centers, including community, migrant, and homeless health centers, that have an oral health component" [USDHHS 2000b]. In 2002, 61% of local jurisdictions and health centers had an oral health component [USDHHS 2004b]; the *Healthy People 2010* target is 75%.

There are currently 20 Federally Qualified Health Care Centers that act as Medicaid dental service providers. Five of these centers serve special migrant populations and, in total, the 20 centers serve 29 out of 83 counties. There are 13 local health departments out of 45 that offer Medicaid dental services through a total of 27 clinics. These local health departments and their network of clinics serve 36 counties in Michigan. There are four Native American dental clinics offering Medicaid dental services in Michigan. These clinics serve populations in nine counties. There are also seven hospital and university Medicaid dental providers in Michigan covering six counties. Information as to the services provided by these various clinics is available in Michigan's Oral Health Program Directory. (http://www.michigan.gov/documents/directory_29654_7.pdf)

A 2004 assessment of adolescent health centers found that 27 of the 55 centers had some oral health assessment component. Most of these sites offered some level of oral health education. 11 centers offered on-site comprehensive oral health assessment, but 9 of those centers provided dental services either once per year, biannually, or quarterly through mobile dental contractors. One adolescent health center had a full time dentist on staff while a second had two dentists combining to serve as a 0.3 FTE on-site dentist for the center.

CONCLUSIONS

It is important to remember that while much is known about the status of oral health in Michigan, there remain several deficiencies. The oral health status of elderly citizens, developmentally disabled persons, and several racial and ethnic groups is difficult to assess across the state. These groups and their oral health needs should not be forgotten due to limited information.

Considerable statewide efforts are needed to assist Michigan in achieving the standards set forth by Healthy People 2010. Improvements in insurance coverage alone will not solve the oral disease burden. Additional health promotion efforts are necessary for the integration of oral health as a component of overall health and well-being. Individuals must practice healthy behaviors such as daily brushing and flossing, regular teeth cleanings, and proper nutrition to prevent disease. Citizens need access to an adequately trained oral health workforce who can provide education, prevention, and treatment. Good oral health must become a fundamental health priority for every Michigan resident throughout life.

For more information about this document or other oral health information, contact the Michigan Department of Community Health, Oral Health Program at 517-335-8388. Or visit the State of Michigan's Oral Health Website at http://www.michigan.gov/oralhealth.

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APPENDIX OF FIGURES AND TABLES

TABLE A1: Oral Cancer Indicators, by County, 1991-2000			
COUNTY	FIGURE 1: ORAL CANCER INCIDENCE RATE	FIGURE 2: ORAL CANCER MORTALITY RATE	FIGURE 3: ORAL CANCER EARLY DETECTION
Alcona	17.7	DNA	DNA
Alger	DNA	DNA	DNA
Allegan	9.2	2.8	38.7
Alpena	13.4	DNA	76.9
Antrim	13.1	DNA	27.3
Arenac	11.6	DNA	DNA
Baraga	DNA	DNA	DNA
Barry	7.7	DNA	46.7
Bay	11.8	2.9	18.6
Benzie	12.8	DNA	DNA
Berrien	11.8	2.8	42.9
Branch	12.3	DNA	45.5
Calhoun	10.6	3.4	41.7
Cass	9.6	DNA	46.2
Charlevoix	11.7	DNA	DNA
Cheboygan	8.2	DNA	DNA
Chippewa	11.6	DNA	DNA
Clare	16.2	DNA	40.0
Clinton	6.0	DNA	DNA
Crawford	13.8	DNA	DNA
Delta	8.6	DNA	DNA
Dickinson	12.5	DNA	36.4
Eaton	7.9	3.0	46.7
Emmet	11.5	DNA	63.6
Genesee	11.7	2.4	50.4
Gladwin	11.7	DNA	53.8
Gogebic	8.2	DNA	DNA
Grand Traverse	11.1	DNA	50.0
Gratiot	7.4	DNA	70.0
Hillsdale	8.8	DNA	66.7
Houghton	12.1	DNA	61.1
Huron	12.2	DNA	25.0
Ingham	10.9	2.1	40.8
Ionia	8.3	DNA	52.6
Iosco	14.3	DNA	22.2
Iron	8.2	DNA	DNA
Isabella	8.4	DNA	81.8
Jackson	12.7	3.7	50.0
Kalamazoo	8.9	2.5	32.8
Kalkaska	DNA	DNA	DNA
Kent	10.7	2.6	58.0
Keweenaw	DNA	DNA	DNA

TABLE A1: Oral Cancer Indicators, by County, 1991-2000, continued			
COUNTY	FIGURE 1: ORAL CANCER INCIDENCE RATE	FIGURE 2: ORAL CANCER MORTALITY RATE	FIGURE 3: ORAL CANCER EARLY DETECTION
Lake	DNA	DNA	DNA
Lapeer	10.8	DNA	44.4
Leelanau	DNA	DNA	DNA
Lenawee	6.5	DNA	21.7
Livingston	8.6	2.1	32.0
Luce	DNA	DNA	DNA
Mackinac	15.3	DNA	DNA
Macomb	11.5	2.7	37.0
Manistee	14.1	DNA	38.5
Marquette	17.7	3.6	44.0
Mason	11.9	DNA	31.3
Mecosta	10.6	DNA	41.7
Menominee	10.6	DNA	14.3
Midland	8.1	3.0	47.1
Missaukee	DNA	DNA	DNA
Monroe	9.6	2.6	14.7
Montcalm	12.0	DNA	37.5
Montmorency	18.0	DNA	58.3
Muskegon	9.7	1.9	40.9
Newaygo	7.8	DNA	38.5
Oakland	11.0	2.8	37.0
Oceana	DNA	DNA	DNA
Ogemaw	13.1	DNA	DNA
Ontonagon	DNA	DNA	DNA
Osceola	14.7	DNA	47.1
Oscoda	DNA	DNA	DNA
Otsego	16.1	DNA	DNA
Ottawa	7.1	1.9	66.7
Presque Isle	11.1	DNA	DNA
Roscommon	12.6	DNA	45.5
Saginaw	9.2	2.8	36.0
St. Clair	14.8	3.4	61.0
St. Joseph	7.3	DNA	41.2
Sanilac	9.1	DNA	50.0
Schoolcraft	DNA	DNA	DNA
Shiawassee	10.2	DNA	36.8
Tuscola	8.9	DNA	DNA
Van Buren	9.9	2.6	28.6
Washtenaw	9.6	1.9	46.7
Wayne	14.3	3.7	34.7
Wexford	11.9	2.9	13.3

DNA – Data not available, rates were not calculated when there were fewer than 20 total events, or fewer than 6 events in an age category.

Counties with less than 10 cases of oral cancer were not included in percent calculations of oral cancer detected at early stages.

TABLE A2: Child Dental Service Utilization in 2002		
COUNTY	FIGURE 6: MEDICAID CHILD - PREVENTIVE DENTAL UTILIZATION (%)	FIGURE 12: ANY CHILD - ANY DENTAL UTILIZATION (%)
Alcona	32	47
Alger	31	52
Allegan	24	57
Alpena	34	54
Antrim	28	57
Arenac	34	51
Baraga	24	52
Barry	29	59
Bay	26	55
Benzie	19	55
Berrien	19	45
Branch	33	54
Calhoun	20	45
Cass	20	45
Charlevoix	33	57
Cheboygan	34	51
Chippewa	28	50
Clare	29	47
Clinton	29	66
Crawford	23	46
Delta	22	50
Dickinson	25	54
Eaton	24	62
Emmet	33	60
Genesee	29	49
Gladwin	32	51
Gogebic	21	48
Grand Traverse	22	57
Gratiot	31	57
Hillsdale	24	53
Houghton	35	58
Huron	37	57
Ingham	22	54
Ionia	29	56
Iosco	30	47
Iron	25	55
Isabella	28	59
Jackson	23	52
Kalamazoo	17	48
Kalkaska	25	47
Kent	19	53
Keweenaw	35	55
Lake	33	49
Lapeer	23	62

TABLE A2: Child Dental Service Utilization in 2002, continued		
COUNTY	FIGURE 6: MEDICAID CHILD - PREVENTIVE DENTAL UTILIZATION (%)	FIGURE 12: ANY CHILD - ANY DENTAL UTILIZATION (%)
Leelanau	23	57
Lenawee	28	57
Livingston	25	69
Luce	38	53
Mackinac	22	54
Macomb	23	61
Manistee	27	45
Marquette	36	63
Mason	24	53
Mecosta	22	48
Menominee	17	53
Midland	31	65
Missaukee	71	46
Monroe	23	59
Montcalm	18	51
Montmorency	31	49
Muskegon	27	48
Newaygo	21	49
Oakland	23	63
Oceana	20	38
Ogemaw	31	48
Ontonagon	40	61
Osceola	21	46
Oscoda	28	48
Otsego	23	53
Ottawa	19	63
Presque Isle	28	54
Roscommon	33	48
Saginaw	29	51
St. Clair	26	54
St. Joseph	23	45
Sanilac	33	55
Schoolcraft	33	51
Shiawassee	31	62
Tuscola	31	58
Van Buren	23	45
Washtenaw	22	63
Wayne	28	43
Wexford	25	44

TABLE A3: Community Water Fluoridation, 2004 & Dental Provider Density, 2004		
COUNTY	FIGURE 4: COMMUNITY WATER FLUORIDATION (%)	FIGURE 9: DENTAL PROVIDER DENSITY (Dentists per 10,000 persons)
Alcona	0	1.75
Alger	63.9	6.12
Allegan	65.2	2.65
Alpena	100.0	6.45
Antrim	24.4	6.30
Arenac	0	2.91
Baraga	42.5	3.45
Barry	45.4	3.11
Bay	98.7	5.65
Benzie	0	4.76
Berrien	72.3	5.05
Branch	19.8	3.90
Calhoun	88.9	5.78
Cass	76.0	1.75
Charlevoix	90.9	7.58
Cheboygan	81.8	4.43
Chippewa	93.8	5.14
Clare	51.1	2.52
Clinton	58.5	2.25
Crawford	77.4	3.39
Delta	96.0	7.04
Dickinson	14.4	8.78
Eaton	70.8	6.82
Emmet	17.4	9.59
Genesee	93.9	5.53
Gladwin	1.7	2.62
Gogebic	26.0	2.87
Grand Traverse	61.4	10.34
Gratiot	68.8	4.01
Hillsdale	76.4	3.41
Houghton	0	5.57
Huron	47.9	3.95
Ingham	94.8	6.72
Ionia	69.1	3.65
Iosco	96.7	4.08
Iron	10.8	3.14
Isabella	64.7	4.03
Jackson	86.6	4.66
Kalamazoo	97.0	6.13
Kalkaska	0	4.11
Kent	96.9	6.50
Keweenaw	0	0
Lake	0	1.72
Lapeer	85.4	3.86

TABLE A3: Community Water Fluoridation, 2004 & Dental Provider Density, 2004		
COUNTY	FIGURE 4: COMMUNITY WATER FLUORIDATION (%)	FIGURE 9: DENTAL PROVIDER DENSITY (Dentists per 10,000 persons)
Leelanau	4.6	5.98
Lenawee	79.1	4.49
Livingston	56.8	5.80
Luce	63.5	4.27
Mackinac	97.4	3.48
Macomb	95.3	7.32
Manistee	74.7	5.18
Marquette	83.1	7.15
Mason	85.4	3.81
Mecosta	89.2	4.58
Menominee	82.1	4.78
Midland	96.6	5.83
Missaukee	60.2	2.01
Monroe	72.6	3.95
Montcalm	53.4	3.84
Montmorency	0	2.84
Muskegon	90.6	5.12
Newaygo	42.8	3.47
Oakland	84.4	11.08
Oceana	0	2.89
Ogemaw	76.9	4.14
Ontonagon	6.6	2.60
Osceola	0	1.70
Oscoda	0	2.12
Otsego	0	7.87
Ottawa	98.4	5.00
Presque Isle	93.8	2.09
Roscommon	0	6.20
Saginaw	97.3	6.43
St. Clair	34.9	5.31
St. Joseph	92.8	2.89
Sanilac	68.5	3.37
Schoolcraft	98.3	3.42
Shiawassee	41.7	3.47
Tuscola	61.8	3.26
Van Buren	45.2	2.85
Washtenaw	93.6	13.61
Wayne	99.3	5.13
Wexford	0	5.85

TABLE A4: Percentage of Children Age 8 to 9 Years with Sealants Applied to First Molars (Figure 5)		
	Michigan (%)	United States (%)
Healthy People 2010 Target	50.0	50.0
By Race/Ethnicity		
Whites	41.6	35.0
Blacks	23.6	23.0
Hispanics	27.5	10.0

TABLE A5: Healthy Kids Dental Utilization by Age, 12 Month Enrollment Beginning October 2003 to September 2004 (Figure 7)				
Age (Years)	Private Plan (%)	Health Kids Dental Year One (%)	Healthy Kids Dental Year Four (%)	Medicaid (%)
0	0.0	2.0	0.5	0.5
1	5.1	3.3	3.7	1.2
2	20.7	10.3	13.7	5.8
3	69.5	37.8	40.5	26.7
4	81.8	53.9	62.5	43.5
5	82.7	52.3	59.3	39.3
6	86.0	51.4	63.4	41.3
7	83.0	57.1	64.9	41.4
8	84.1	55.2	64.7	42.2
9	83.4	54.7	63.5	41.4
10	81.6	52.0	63.4	40.9
11	80.0	48.1	59.7	38.8
12	78.6	49.4	56.7	36.3
13	77.4	46.5	55.4	38.4
14	75.7	46.7	52.6	37.8
15	75.0	46.9	51.5	35.1
16	72.8	42.7	52.8	37.7
17	69.8	45.3	49.9	33.6
18	62.2	43.6	46.6	32.8
19	56.1	35.5	38.6	27.8
20	50.8	32.0	42.2	23.6